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Worldwide Report

NUCLEAR DEVELOPMENT AND PROLIFERATION

No. 147

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ANTI-NUCLEAR RALLIES HELD IN VARIOUS CITIES GET BIG CROWDS

Melbourne Demonstration

Melbourne THE AGE in English 5 Apr 82 p 3

[Article by Andrew Bolt] Many thousands of people marched through the city yesterday in a rally for nuclear disarmament. Police estimated the crowd at about 20,000. Rally organisers said more than 40,000 attended.

The rally stretched for seven city blocks as demonstrators walked slowly behind a drum corps, which beat a funeral march.

Police said the crowd was the biggest seen at a city rally since the Vietnam moratorium marches.

Below the forest of banners, flags and signs were mingled Franciscan monks, Spartacists, ALP and ACTU representatives, trade unionists, International Socialists, conservationists and church and student groups.

Nuclear war "victims" drew a cart bearing a figure of death and a large blackened globe of the world, as jazz bands behind played swing to the steps of hundreds of demonstrators packed around them.

The rally was to support the United Nations resolution calling for disarmament. Similar rallies in Sydney, Wollongong, Hobart, Adelaide and Perth have been held in the past three days.

The Melbourne rally began about 1.30 pm at the Treasury Gardens. A spokesman for People for Nuclear Disarmament, Dr Joe Camilleri, told the crowd they were there because they wanted to "reassert our common humanity".

Dr Camilleri, a senior lecturer in politics at Latrobe University, said the nuclear arms buildup now threatened the life of every person. "We reject this senseless race into oblivion," he said.

After a fiery Professor Manning Clark urged them to "say no firmly to death and destruction; say yes firmly to life and to love", the protestors began the march through the city to the Flagstaff Gardens.

There a retired West German general, Gert Bastian, told the crowd that the major powers had failed to grasp the dangers of the weapons they were stockpiling.

General Bastian, who resigned in protest against his country's deployment of United States nuclear missiles, said the world now stood at the crossroads between death and a future free of nuclear weapons. A further arms build-up would make a nuclear catastrophe inevitable. He said the major powers sought a security based or mass murder and fear of an imaginary enemy. "To threaten mass murder is not a morally justifiable way of ensuring peace," he said.

A lighter note was struck by the Anglican Bishop of Bendigo, the Right Reverend Oliver Heyward, who inadvertently referred to the "United Snakes". The crowd liked that.

Record Crowd in Sydney

Sydney THE SYDNEY MORNING HERALD in English 5 Apr 82 p 3

[Article by Richard McGregor]

[Text] Thousands of people marched through Sydney yesterday in support of nuclear disarmament. Police and march organisers said it was the largest rally in the City since the anti-Vietnam war demonstrations.

The march coincided with rallies throughout the country on the weekend, marking what organisers hope will be the beginning of a mass peace movement in Australia.

Police said the crowd in Sydney was between 20,000 and 30,000 people.

The promoters said more than 40,000 marched in the rain.

The march began at Circular Quay, and proceeded along George Street. It took almost two hours to pass the Town Hall. Organisers were enthusiastic about the turnup, which they said was "beyond all their expectations."

The front line included the Labor MP, Mr Tom Uren, the author Mr Patrick White, the Deputy-Premier, Mr Jack Ferguson, Bishop John Reid, who was a leading candidate in the ballot for a new Anglican Archbishop of Sydney, and the head of the NSW Ministry of Aboriginal Affairs, Mrs Pat O'Shane.

Southern Hyde Park was overflowing with balloons, banners and placards for the speeches and entertainment at a rally later in the afternoon. Many people sat in the trees and at the War Memorial to view the stage.

Mr White, addressing the crowd as "fellow human beings," said nuclear war was the most serious issue that had ever faced the "global family."

"By now, Australia has become an important nuclear target, and nowhere have the people been consulted," he said.

"French nuclear tests will bring nuclear war closer to those who feel their island is inviolable."

Mr White attacked what he said was the lack of respect shown by uranium miners to Aboriginal land rights, and the people who he called the "Frankenstein consortioum of American millionaires who had launched on the world their monster, Ronald Reagan, a figure out of his own B-grade movies."

He called on all Australians to contribute "to the life force rather than collaborating in the death of the world."

Other speakers included Mr Peter Cook, the vice-president of the ACTU, and at the beginning of the rally, Mrs Pat O'Shane, and the federal secretary of the Seamen's Union, Mr Pat Geraghty.

They concentrated mainly on the issues of uranium mining, Aboriginal land rights, the arms race and military spending, and the threat of nuclear war.

Mr Cook said the money spent on nuclear arms meant a massive deployment of investment away from welfare to war.

The thousands, both old and young, who marched for peace yesterday came from broad sections of the community, ranging from many Church and union groups to islanders calling for a nuclear-free Pacific.

The Sydney march was organised and sponsored by 43 groups and individuals who were represented on a rally committee. They included environmental groups, a number of trade unions and Labor politicians, the Quaker Peace Committee, and the association, Arab Friends of Labor.

The main backing came from the Association for International Co-operation and Disarmament, the Uniting Church and key unions. The march was promoted by advertisements in the Sydney press, and paid for by groups representing among others, journalists, doctors and the Seamen's Union.

The chairman of the Sydney Rally Committee, the Senator Bruce Childs, said that he expected the success of the march would provide the impetus for the formation of a permanent group for nuclear disarmament.

March in Perth

Perth THE WEST AUSTRALIAN in English 5 Apr 82 p 3

[Excerpts] SYDNEY: Anti-nuclear marchers yesterday staged the biggest rally in Sydney since the days of the Vietnam moratorium demonstrators.

In PERTH, more than a thousand people scorned the heat and flies to march to the Supreme Court Gardens yesterday.

The protest rally was organised by the People for Nuclear Disarmament. WA groups taking part included Doctors against Nuclear War, United Nations Disarmament and Peace Committee, Community Aid Abroad, Campaign Against Nuclear Energy, WA Peace Committee and the Indian Ocean Peace Coalition.

In the heat of the afternoon the people, who were mostly young with children, listened to speeches from Senator Ruth Coleman, Dr Harry Cohen, Dr Keith Suter and Miss Louise Duxbury.

Telegrams from anti-nuclear organisations in the Eastern States supporting the Perth protest were read to the crowd which responded with loud applause.

Dr Cohen, the State organiser for the Medical Association for the Prevention of War, said that an unprecedented world mass movement was needed to stop nuclear warfare.

"It is up to the ordinary people to do something about the presention," he said.

Dr Suter, the president of the United Nations Association in NSW warned the people that they would be the victims in a nuclear holocaust.

CSO: 5100/7528

BRIEFS

NUCLEAR DISARMAMENT ISSUE--Australia holds an important place in the United States world strategy and as such can put pressure on the U.S. to reduce its nuclear arsenal, according to the president of the Association for International Co-operation and Disarmament, Dr. Keith Suter. Dr Suter is in Perth to speak at a rally to be held in the Supreme Court gardens on Sunday--National Peace Day. At a press conference organised yesterday by the WA branch of the People for Nuclear Disarmament group, he said Australians should be alert to the dangers of the arms race. It highlighted the risk of nuclear war through accident, computer-error or human failing. "What we must do is find a way of getting the super powers to co-exist so that they will reduce their nuclear stockpiles as well as their conventional armies." Dr Suter said. Dr Suter, the Dean of Students at Sydney University rejected the belief that the major powers need wars to bolster failing economies. "The Vietnam war came to an end because Wall Street joined the people and said that the war was too expensive. The same thing will happen with nuclear weaponry. The business community will say that it can no longer justify the expense of arms manufacture," he said. [Perth THE WEST AUSTRALIAN in English 2 Apr 82 p 17]

CSO: 5100/7528

RAO TALKS TO RAJYA SABHA ON TARAPUR AGREEMENT

New Delhi PATRIOT in English 1 May 82 p 6

[Text]

India is considering its future course of action regarding the 1963 Indo-US nuclear agreement as the United States has defaulted on its obligation to supply fuel, External Affairs Minister P V Narasimha Rao told the Rajya Sabha on Friday, reports UNI.

He said discussions had been taking place between the two governments to determine the future of the agreement but so far no decision had been taken.

Mr Rao said licences for a number of orders for spare parts for the Tarapur Atomic Power Station were pending with the US authorities for want of export licences.

Mr Rao said the inordinate delay by the United States in issuing such licences had caused difficulties in the operation of the Tarapur plant. But the Government of India would take all necessary steps to ensure that during the operation of the power station, the required safety regulations would be observed, he added.

He said the attention of the United States had been drawn repeatedly to the continuing delay in the supply of spare parts through diplomatic channels. The matter was also taken up during the Indo-US sub-commission meeting on science and technology in New Delhi in December 1981.

Since the prime contractors for the Tarapur plant are General Electric of the United States in accordance with the past practice, the orders for spares had been placed with the US. They were still pending.

CSO: 5100/7091

PLUTONIUM-BASED FAST BREEDER REACTOR FOR 1983

New Delhi PATRIOT in English 6 May 82 p 5

[Text] India's first plutonium based Fast Breeder Test Reactor (FBTR) to generate power will go on stream at the Kapakkam Reactor Research Centre (RRC), near Madras, by the end of next year, reports UNI.

According to the 1981-82 annual report of the Atomic Energy Department, about 90 percent of the work on the FBTR is already completed.

Work at RRC is related to the development of various aspects of breeder reactor technology and as a part of these efforts the Centre is working on a prototype fast breeder reactor.

Fuelled by plutonium, the fast breeder reactors form part of the second phase of the country's nuclear power strategy enunciated by former Chairman of the Atomic Energy Commission (AEC) late Homi Bhabha.

In the first stage of the strategy, Pressurised Heavy Water Reactors (PHWRS) fuelled by natural uranium produced power and plutonium as by product.

The fast breeder reactors, besides generating power, will also produce more plutonium as well as uranium 233 from thorium placed in the blanket. All major reactor components for FBTR have been fabricated in India.

The AEC has drawn up a plan for increasing its installed nuclear power capacity to 10,000 MW by the turn of the century from the 860 MW being generated now.

Currently, two atomic power stations, the 420 MW Tarapur Atomic Power Station and the 440 Rajasthan Atomic Power Station, are in operation.

Two more, with a capacity of 470 MW each, were under construction in Madras and Narora in Uttar Pradesh. The department is also going in for yet another power station at Kakrapar in Gujarat with a capacity of 470 MW.

The first unit of the Madras atomic power project is expected to be commissioned this year. A little over 99 percent of the work of the unit has been completed. The second unit will go on stream in 1984 with about 85 percent of the work having already been completed.

Unlike the Tarapur power station, which use enriched uranium, all the nuclear plants in operations or under construction or planned would be fuelled by natural uranium and pressurised heavy water.

While the two units of the Narora atomic power project is expected to be commissioned in 1986 and 1987, the units of the Kakrapar project will start generation by 1990 and 1991.

Narora is also based for taking off on a 500 MW unit. Many of the components for the Narora plant have been designed to permit easy transition to the 500 MW size. The work of designing a 500 MW reactor is ready and 12 such units are planned before the turn of the century.

CSO: 5100/7093

ATOMIC ENERGY CHIEF HOLDS PRESS CONFERENCE

Madras THE HINDU in English 1 May 82 p 1

[Text]

HYDERABAD, April 30.

The Nuclear Fuel Complex (NFC) here has embarked on an expansion programme of doubling fuel production to 200 tonnes a year to meet the growing requirements of the various atomic power stations.

Dr. H. N. Sethna, Chairman of the Atomic Energy Commission (AEC) told a news conference here on Friday that additional facilities were coming up in the various fuel plants for this. He hoped the doubling of the capacity would be achieved in 18 months. The investment for the expansion programme would be Rs. 14 crores.

Asked about the supply of enriched uranium from the U.S. for the Tarapur atomic power station all that Mr. Sethna could say was that after October 1980, no further shipments had arrived and that 'no great hopes of continuance of supplies are held out'.

In the event of U.S. not making further supplies, India would manage with mixed fuel or reprocess the spent fuel.

Mr. Sethna said with the stoppage of supply of enriched uranium from the U.S. and to stretch the use of existing stocks, the generation at Tarapur was reduced by 20 per cent and was running at 50 per cent of the installed capacity of 420 MW.

Kalpakkam unit: He said the Kalpakkam atomic reactor near Madras would be operative by the end of the year. This was delayed for want of heavy water.

In the context of the perspective plan for raising nuclear power generation from the present 1,800 MW of installed capacity to 10,000 MW by the turn of the century, Mr. Sethna was asked to explain how this could be achieved with only the Ranapratapsagar and Tarapur plants actually operating.

Mr. Sethna tersely replied "by working like mad and making other people also work like mad".

Mr. Sethna said no decision was taken on the setting up of an atomic power station near Nagarjunasagar in Andhra Pradesh. Various States were offering to show 'suitable sites'. It was decided that the next atomic plant should be set up in South and the site selection committee would give its report in due course.

The AEC chairman who came here to participate in NFC Board meeting, chose to skip questions on recent mishaps at the NFC saying 'magisterial inquiry' was on. As an experimental measure, NFC had introduced use of water hyacinth in its water effluents treatment plants. The water hyacinth had the property of absorbing nitrates and heavy metals and cleanse the water which could be used for gardening.

Mr. Sethna said heavy water plants with a capacity of 200 tonnes a year were proposed to be set up at Manuguru near Bhadrachalam in Khammam district of Andhra Pradesh and at Thal Vaishat in Maharashtra.

Set up in a sprawling 800-hectare complex, NFC is one of the very few places in the world where the entire process starting from raw material to assembly of fuel bundles is made under one roof. NFC had started production of stainless steel tubes (2000 tonnes a year) and ball bearing tubes (21,000 tonnes). A plant for fabricating components for the fast breeding reactor coming up at Kalpakkam had also been set up at NFC.—Our Staff Reporter.

CSO: 5100/7090

PLANNING COMMISSION MEMBER WANTS INDIA TO GO NUCLEAR

New Delhi PATRIOT in English 3 May 82 p 10

[Excerpt]

India is in danger —the threats lie without, within, in its economic policies, its defence strategies, because of its friends and foes and most of all because of its people.

The country will have to weather the perpetual storm caused by the above problems and move on its path of development, a gathering of intellectuals and opinion builders felt at a seminar on Sunday.

The lengthy seminar on threats to national security and stability, organised by the Quami Ekta Trust, addressed itself to numerous causes of problems and groped for possible solutions.

Chairing the seminar, former bureaucrat and Planning Commission member P N Haksar dwelt at length on the causes of instability. Secularism in its true sense would be the right basis of true stability, but history had time and again shown that the concept of secularism in India was hung up only on religious tolerance.

Mr Haksar also spoke about the threat of thermonuclear weapons. If Pakistan, with its limited financial resources, had procured nuclear weapons, "India has a case to have it too," he felt.

Looking at the international level of sophistication in nuclear weapons systems, the Indian concept of a nuclear implosion was primitive.

India's concept of a war, Mr Haksar said, was restricted to Indo-Pak exchanges only in the minds of the common people. They would have to be made aware of the dangers of the US military bases in the Indian Ocean, the struggle of the frontline South African countries fighting for their independence.

India, Mr Haksar regretted, had taken the back-seat in creating world opinion against the rigours of a nuclear war. It was time she called an emergency meeting of non-aligned countries and demanded the non-proliferation of the arms race.

On the national level, Mr Haksar felt, the present day political scenario had nothing new or substantial to offer as security to the nation.

The people had not been enthused into the task of nation building, they did not feel a sense of participation in creating their own destiny. The state of the bureaucracy as well as the institution of parliament was almost one of decay which did not again infuse enthusiasm in the citizens.

CSO: 5100/7092

BRIEFS

HEAVY WATER PRODUCTION--India will achieve self-sufficiency in heavy water required for nuclear power plants with the setting up of additional heavy water plants, the Rajya Sabha was informed on Thursday, reports UNI. In a written answer Minister of State for Science and Technology C P N Singh said the heavy water plants at Talcher and Kota would be commissioned in the current financial year. Action had been taken for setting up two more heavy water plants with effective capacity of 295 tonnes per year. Additional heavy water plants would be set up to meet the cumulative demand of 13,000 tonnes of heavy water required for the power programme by the end of this century. [New Delhi PATRIOT in English 30 Apr 82 p 5]

NUCLEAR PLANT LIKELY FOR BHOPAL--BHOPAL, April 27--The country's second nuclear power research centre is likely to be located near Bhopal, according to State Government sources, reports UNI. Three sites were approved for the research centre by a three-member team of experts, which visited Bhopal last week. The sources told reporters that the team considered the availability of water, electricity, and land and communication facilities. The first research centre is functioning at Trombay. The site selection team was headed by Mr J. V. Pai, the joint secretary in the Ministry of Atomic Energy. Other team members were Mr V. K. Iyenger, the director of nuclear physics, Trombay, and the Amba Shankaran of the Bahba Atomic Research Commission at Bombay. The team also called on the Chief Secretary of the State Government and told him that about 2,000 men would be employed in the proposed research centre. Housing facilities would have to be provided for their families, sources added. The proposed research centre is in addition to the heavy water plant to be established in Madhya Pradesh. [Calcutta THE STATESMAN in English 29 Apr 82 p 12]

CSO: 5100/7088

INDIAN WRITER CLAIMS PAKISTAN 'DETERMINED' TO HAVE BOMB

Bombay THE TIMES OF INDIA in English 1 May 82 p 8

[Article by S. K. Sharma]

[Text] It is well known that Indians are divided on whether the government should go in for nuclear weapons. But hardly has any one disputed the veracity of reports that Pakistan is making a determined bid to acquire the bomb. Mr. Ravi Rikhye has now done so in your columns, ignoring the fact that the Pakistanis could not have been involved in so many clandestine deals in sensitive materials and equipment just for a civilian nuclear programme.

Mr. Rikhye's main case is that Pakistan does not possess suitable fissile material--enough enriched uranium and plutonium. It has been argued that the plutonium produced in the civilian reactors contains 'too high' a percentage of PU-240 isotope to be used for weapons.

This problem is not new; it has been there since the first-ever plutonium bomb was made and dropped over Nagasaki. The problem is also by no means insurmountable. The Manhattan project faced the plutonium-240 obstacle in that the spontaneous neutron emission rate of PU-240 made the gun-barrel system unusuable for a plutonium bomb. It got over it by inventing the implosion device (where concentric spherical, subcritical masses of plutonium are compressed by a chemical charge to produce fission).

Of course, the implosion device is relatively more demanding in terms of technological sophistication. For these reasons the first plutonium bomb needed to be tested whereas the first uranium bomb was delivered without testing. But it is not correct to argue that the PU-240 content precludes the making of a plutonium fission device. When one talks of Pakistan following the plutonium route, one tacitly implies that it would develop an implosion device to cope with the PU-240 problem.

PU 240 Content

What is the difference between the weapons-grade plutonium and the reactor-grade plutonium? The weapons-grade plutonium makes a very efficient bomb since the PU-240 proportions is considerably reduced by regulating the irradiation time of the U-238 fuel rods. In the reactor-grade plutonium this is

not done. So the PU-240 content is high. In reality the Pakistanis are suspected to be attempting replacement of their fuel rods at regular intervals to reduce the PU-240 content.

Since Pakistan now has a fuel fabrication unit it is possible for them to carry out such replacements without being detected. The cause for suspicion is that the IAEA inspectors have faced difficulties in enforcing safeguards in the Pakistani reactors. The Pakistani authorities refused to agree to the IAEA's keeping the 'bundle counters' which could keep track of the fuel rods inside the reactor. About 200 to 300 days of irradiation time is adequate for getting plutonium with a suitable proportion of the fissile isotope.

Even in the worst case where the PU-240 content is not reducible to a minimum, a crude plutonium device can be made. To quote SIPRI, "a new nuclear-nation should be able to produce a 20-kiloton atomic bomb with a mass of about 1000 kg even at an early stage in its nuclear power programme." The only difference is that the 'critical mass' becomes high if the plutonium does not have a right isotopic mix. (In case of a bad mix, as high as ten times).

We must be clear that when we discuss the probability of a Pakistani bomb, we are thinking in terms of a crude device and not in terms of a warhead for a missile. But whoever talks of missiles while discussing the first bomb? After all, the Hiroshima bomb weighed 4000 kg and had an explosive power of 12 kilotons. It was utterly crude in comparison to the modern warhead which at 100 kg weight has a yield of 170 kilotons. According to a U.S. congress report on "nuclear proliferation and safeguards", "many nations are capable of designing and constructing nuclear explosives which could be confidently expected ... to have predictable and reliable yields in the kiloton range using reactor-grade plutonium."

Research Reactors

Let us look at Pakistan. The London-based Institute of Strategic Studies reported that Pakistan possessed about 30 kg of plutonium by 1980 which is expected to rise to 605 kg by 1984. It has power and research reactors to carry out the requisite experiments prior to a 'test' and its scientists are classified as 'very good'. In May 1979, the former U.S. assistant secretary of state, Mr. Thomas Pickering, had reported that Pakistan had perfected the blast wave detonation technique which is employed in the bomb trigger. A "Chritian Science Monitor" report in November last year gave an extensive description of the 'technology flow' to Pakistan through numerous subterfuges and agencies whereby the essential components of a bomb were slowly and steadily obtained.

The moment a country has enough plutonium it nears the fulfilment of her mission. According to SIPRI, about 8 kg of plutonium is enough for a bomb. So even if one were to increase this requirement by 10 times, Pakistan can still make a few bombs with 600 kg of plutonium.

As for the uranium route, there is no proof about any let-up in the Pakistani quest for setting up an enrichment plant. In spite of the U.S. attempts to

to block uranium sales to South Africa, that country did succeed in securing enough enriched uranium for its Koeberg plant. Why should it be necessarily different in Pakistan's case? It is wrong to say, as Mr. Rikhye does, that the international black market in uranium is confined to uranium with less than three per cent enrichment. As high as 60 per cent enriched uranium has reportedly been available at a premium. Again, while 90 per cent enriched uranium is ideal for a weapon, lower percentages can still do for a bomb. Only the bomb will be heavier and clumsier.

A plutonium bomb made out of reactor-grade material poses considerable storage problems as the assembly gets over-heated due to alpha emission, creating difficulties in retaining the whole contraption for any length of time. Therefore one can reasonably assume that the explosion of a plutonium bomb, once produced by Pakistan, cannot be delayed beyond a point.

As for delivery, several aircraft apart from the F-16 can do it. During the Congressional hearings last year about the F-16 sales, Mr. Buckley had admitted that the aircraft would have bombing racks for a nuclear weapon. Mr. Daniel P. Moynihan in his speech had even warned of a full-fledged Pakistan nuclear force with the F-16s and the Saudi F-15s. The mirage 3's and mirage 5's can also be used.

CSO: 5100/7089

PROGRESS OF NUCLEAR INSTITUTE OF AGRICULTURE AND BIOLOGY DISCUSSED

Lahore THE PAKISTAN TIMES in English 14 Apr 82 p 4

[Editorial: "NIAB's Progress"]

[Text]

A function celebrating the first decade in the life of Pakistan's Nuclear Institute for Agriculture and Biology (NIAB) provided President Zia-ul-Haq the opportunity to reiterate the country's commitment to bend nuclear technology to peaceful uses. Against the agricultural backdrop of the national economy, NIAB is the premier project of the Pakistan Atomic Energy Commission. The President complimented the scientists working at NIAB on their contribution to the modernisation of the country's agriculture and appealed to them to step up their efforts to tackle some of the problems lying at the root of our low productivity in the sector and to enable Pakistan to become an agriculturally surplus country commensurate with the proportion of its manpower engaged in the production of food. While the national economy has tackled the more sophisticated problems of industrialisation, it must now turn its attention to the relatively uncomplicated sector of agriculture. The President drew the attention of the scientists to the colossal damage caused each passing minute by water-logging and salinity in the cultivated areas and asked them to evolve an indigenous response to the menace. The second most serious threat to our agriculture, the water resource, its waste and mismanagement, is a double-edged blessing which must be scientifically harnessed to advance the sector of agriculture.

The world has so far developed 230 varieties of wheat through nuclear cytogenetic research. The right seed and its widespread acceptance by the farmer can guarantee a ten-fold increase in the production of wheat. Yet, seed alone cannot transform agriculture. The soil must be chemically fit to receive the seed. Parasitic weed and destructive insects must be extirpated to allow the seed to flourish in the soil and fertilisers must constantly strengthen the fertility of the soil to accelerate growth. NIAB, together with other organisations in the country, is trying to improve crop varieties and is doing it

through genetic mutations in the seed. It has already developed mutations of Basmati rice which can be cropped twice in one season. It has also succeeded in evolving a short-duration, heat-tolerant and high-yielding mutant of cotton which has experimentally produced 50 maunds in an acre. It has cultured a special grass which flourishes in salt-dominated soil and lowers salinity and is experimenting with it on 150 acres acquired near Lahore Research on micronutrients is progressing rapidly to supplement the productive strength of the soil under cultivation. NIAB is also involved in the technology of food preservation and has successfully used radiation to arrest sprouting in such stored products as garlic, potato, onion, etc. Biotechnological research is devoted to the complex process of recombining DNA structures to produce varieties of botanical products to increase proportions of proteins and enzymes. In short, the institute is placed squarely in the centre of our plans to break out of stagnation in the domain of agriculture. According to the President, the Government will do whatever it can to promote the work being done at NIAB as Pakistan's contribution to the international movement to use nuclear technology for peaceful purposes.

CSO: 5100/5654

REVISION OF NUCLEAR POLICY SEEN AS RESULT OF FALKLAND CONFLICT

Buenos Aires CLARIN in Spanish 21 Apr 82 pp 16-17

[Article by Martin F. Yriart, a journalist specializing in nuclear energy and a consultant for the CNEA]

[Text] The Malvinas conflict has suddenly placed Argentina's nuclear policy in a new light. The importance of the nuclear sector should not come as any surprise, though, for two fundamental reasons.

The first is that a conflict about sovereignty affects not just the tiny portion of territory that is being disputed, but it also affects the entire nation involved, in a structural manner. The second reason is that nuclear development is a strategic issue, both in the broad sense of the term, and also in a more restricted, military sense.

On Tuesday, 6 April, at an interval of 4 days from the recovery of the Malvinas by Argentina, Argentina and the Soviet Union signed contracts for uranium enrichment and other nuclear supplies to be provided by the Soviet Union. It is assumed that the Soviet delegation consulted Moscow and received instructions to move ahead. For the Soviets, there is no overwhelming economic interest in this deal; it is simply a modest commercial operation. But for Argentina, it means a resolution of the crisis caused by the refusal of the United States to supply fuel for our research reactors.

That same week, the UNSCEAR [United Nations Scientific Committee on the Effect of Atomic Radiations], a major UN body, elected as its chairman an Argentine national, a top official of the CNEA [National Atomic Energy Commission]. A week later, another CNEA expert became president of the Latin American section of the ANS [American Nuclear Society], the

regional nuclear technology organization. In both instances, individual merit was a decisive factor. But this is also a mark of recognition for Argentina's nuclear development and policy.

Sovereignty is not an abstract concept, but neither is it limited just to territorial issues. In response to Argentina's recovery of the Malvinas, there is now a plan to restrict our economic freedom by means of the trade embargo that the Commonwealth and the European Economic Community want to impose on us, at the urging of Great Britain. Both Japan and the USSR, along with some of the other industrial nations, have opposed this embargo.

Supplies

In principle, these measures should not affect contracts that have already been signed for Argentina's nuclear imports. Our country is now waiting for equipment and technology to be provided by the Federal Republic of Germany, Austria, and Switzerland, as well as from some of the other European nations, for the Atucha II nuclear power plant and the Arroyito heavy water plant. Some equipment is also expected from Canada, which will be used to put the Embalse Nuclear Power Plant into operation before the end of the year. Until a few months ago, the fuel for use in such power plants had to be imported from the Federal Republic of Germany.

The vigorous impetus toward self-sufficiency imparted by the CNEA during the past 6 years, an effort which has encompassed all fields (reactor design and construction, critical components, fuels, heavy water, uranium exploration and mining), should help to frustrate any attempted nuclear embargo.

The decision to promote an Argentine heavy components industry for nuclear power plants, which met with some criticism 3 years ago, has today demonstrated its value, and the subsidies granted were paid off at the same time as the EEC's economic sanctions against Argentina were announced. There can not be the slightest doubt that from now on, the policy of self-sufficiency in engineering, equipment, and nuclear supplies will continue, and will be improved wherever possible.

This is a credit to be held to use against future pressures. A credit Argentina has acquired by working diligently to develop the peaceful uses of nuclear energy, by denouncing discrimination and the arms race, and by helping other developing nations like ours to acquire their own experience and capability in this field.

But this still does not protect us against all risks.

The presence of British nuclear submarines in our territorial waters once again revives the issue of the meaning of the non-proliferation policy as stated in the TNP [Non-Proliferation Treaty]. About 10 years ago, when the TNP was drafted, there were some doubts expressed about whether naval nuclear propulsion systems were strictly for military use, or could also have civilian applications. Today, after the dismantling of the U.S freighter, the "Savannah," and the German "Otto Hahn," and the confinement of the Japanese vessel, the "Maru," there can no longer be any doubt that nuclear propulsion's sole application is as a component of an arms system, plus some other strategic applications (icebreakers).

The TNP favors the United Kingdom because, as it was drafted 10 years ago, it did not include that aspect. The same thing can be said about the Tlatelolco treaty--whose Protocols I and II were signed by Great Britain--for the same reasons. There is also the added irony that Tlatelolco places on the signatory countries which possess nuclear weapons such as the United Kingdom the obligation not to use them or threaten to use them against any treaty member. And now we have four, or perhaps even six British nuclear submarines invading Argentina's waters.

Even though they may not be carrying any atomic missiles, still these British submarines do constitute a serious threat against our nation in the nuclear field. It is a macabre sort of paradox that if an Argentine ship, operating in either confined or shallow waters, were to seriously damage a British submarine with nuclear propulsion, this would create the risk of releasing highly radioactive materials from the nucleus of the reactor, which could produce environmental damage of a magnitude difficult to predict. In a nuclear war this risk is minimized in comparison with the damage that may be produced by atomic bombs, but that is not the case here.

A recapitulation of all this shows that our nuclear policy has won us respect and support, especially among the developing nations. Today our non-proliferation position is accepted by nations such as the Soviet Union. If not, they would not provide us with assistance in the nuclear field. Our nuclear development frees us to a great extent from external pressures, but despite all that, we are still vulnerable to a power such as Great Britain which, just by bringing nuclear submarines into our waters, threatens us with an atomic stranglehold.

We have demonstrated our sincere support for the principles of the non-proliferation of nuclear weapons by our actions. It is now up to Great Britain to demonstrate that, in addition to signing treaties, it intends to comply not only with the letter, but also with the spirit of these treaties. The Malvinas conflict is a territorial dispute between two nations. But this nuclear threat presents a risk for all humanity.

7679
CSO: 5100/2166

DEVELOPMENT OF NUCLEAR WEAPONS IN SOUTH AMERICA ANALYZED

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 29 Apr 82 p 9

[Commentary by Rubens Rodrigues dos Santos: "Nuclear Weapon on the Continent"]

[Text] News reports from the theater of naval operations in the South Atlantic inform us that Britain has four nuclear submarines there, a fact that perhaps has led the chairman of the Argentine National Atomic Energy Commission to hasten to declare that his country is in a position to build atomic weapons. Immediately afterwards, it was reported that Soviet nuclear submarines were operating in the Malvinas region and that the USSR placed itself at the side of Argentina "against the colonialist aggression of Britain and its U.S. partner."

Obviously Vice Admiral Carlos Castro Madero knows very well that the designation of nuclear submarine does not necessarily mean that there are atomic weapons aboard because what really gives that war vessel that name is the nuclear reactor that provides its propulsion. On the other hand, the Soviets and British also know that fact very well but prefer to continue to keep up in the air the question: is there really a possibility of a nuclear conflict breaking out in the South Atlantic?

After its communique, which opened the era of nuclear weapons in South America, is Argentina in a position to confront the British with atomic weapons? Would Britain, which even has thermonuclear bombs in its arsenals, dare to use them? And under what circumstances would the Soviet Union intervene in the conflict? Finally, what position would the South American countries find themselves in, particularly Brazil, in that intricate preliminary game in which persuasion and deterrence have not yet made themselves felt explicitly?

It is well to reiterate once again that we are not driven by any intent to create any offense between the fraternal peoples of Brazil and Argentina. On the contrary, we believe that the calm and careful examination of a matter of such importance as well as its clarification before the public in fact represent an effective action to prevent possible impulsive acts that could lead to points of difficult return, as is occurring today in the Malvinas crisis.

Position of Brazil

Brazil could not in any way remain indifferent to what was being done on the other side of the River Plate during the last decade and which was finally confirmed by the chairman of the National Atomic Energy Commission of Argentina, our partner in the friendly game that is taking place on the chessboard of South American geopolitics in a suitable or unsuitable manner, striking it right here and committing mistakes there, spending what it could as well as what it could not (for the time being, let us disregard the merit and deal only with the de facto situation), our country perhaps is in a position today--or it will be in a short time--to take the same political decision as Argentina and thus to get a plutonium-fission atomic bomb.

To those who refuse to view this question pragmatically, we would say once again that it is necessary to be frank and to face the problem directly, without beating about the bush and without false modesty. If the assumptions made in the preceding paragraph may not be valid today, there is no doubt that they will be so in the coming years. It is valid, therefore, to discuss this inevitability of our times: Brazil and Argentina, both of them possessing one or more nuclear-fission weapons, are the largest, most populous and richest in South America. They have long common borders and some potentially conflicting economic interests. Their peculiar socio-political structures, depicted in different demographic charts (125 million and 40 million inhabitants, respectively), may evolve slowly or rapidly in unexpected configurations. In addition--as we stressed in a previous article--the predominant nature of the officers of the respective armed forces reveal some marked differences.

Furthermore, there is an aspect of the nuclear question in South American that transcends Brazil-Argentine geopolitics: the clear possibility of the occurrence of another chain reaction; not that caused by the neutrons colliding with the nuclei of plutonium--which is easy to control--but rather a chain reaction generated by elementary human impulses, often unforeseen and uncontrollable, strongly aroused on our continental stage by nebulous antagonisms transformed into alleged reasons of state: first Chile, because there is the dispute over the Beagle Channel; Peru wants to regain the territory of Arica and quarrels with Ecuador over the El Condor cordillera; Bolivia continues to dream of regaining an outlet to the sea; Colombia is going through one of the most serious internal convulsions in the Americas; and Venezuela is threatening to invade Guyana to regain the Essequibo region.

From all appearances, in the future, it will not be necessary to have much more than a good nationalistic-type impulse--of those common in Latin America--and 1 kilo of nuclear pure plutonium properly packaged in an electromagnetic device for us to face the worst....

Can anyone doubt that South American geopolitics, still in this century, could come to be defined preponderantly on the basis of that tragic succession of antagonisms, which will certainly be negotiated and decided by the military men and politicians we know so well, marked by "South Americanism," all of them, by that time, grasping the reasons impulsively concocted by them in one hand and their home-made atomic bombs in the other?

8711
CSO: 5100/2162

KWU RECOMMENDS DEVELOPMENT OF JET-NOZZLE ENRICHMENT PROCESS HERE

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 27 Apr 82 p 36

[Text] Rio--The representative of the Kraftwerk Union (KWU) in Brazil, Engineer Wolfgang Breyer, said yesterday that even if the jet-nozzle process for the enrichment of uranium purchased from Germany by Brazil is uneconomical, it needs to be developed by Brazil to guarantee the independence and self-sufficiency of the nuclear program. He pointed out that Germany has been exploiting coal, which is not economical, to guarantee its independence in that sector.

According to Breyer, Brazil was not in a position to develop any other uranium enrichment process. All the other doors were closed to Brazil, which "took the last bus in the world to obtain sensitive technology." He stressed also that the jet-nozzle process is one of the easiest to maintain under safeguards and any attempt at enrichment that was not for peaceful purposes would be discovered.

In the opinion of the KWU representative, the jet-nozzle process can produce highly enriched uranium sufficient for nuclear devices but it is much more difficult than the ultracentrifugal method. Because the jet-nozzle process requires a fixed installation of 300 to 400 stages, all in series, nothing in parallel, while the centrifugal process requires 10 stages which can provide for other parallel stages that could escape the control of the International Atomic Energy Agency (IAEA).

The jet-nozzle process requires large quantities of uranium to enrich very little while the centrifuge works with small quantities but achieves a high degree of enrichment.

Easy Inspection

In Breyer's opinion, "it is easier to inspect the jet nozzle to guarantee the safeguards, and neither Brazil nor Germany want to burden the nuclear agreement with suspicion." The engineer pointed out in that connection that for the enrichment of uranium for peaceful purposes on the basis of 3 percent, the jet-nozzle process does not present any disadvantages compared to the other methods.

Breyer believes that URENCO's ultracentrifugal technology established for reasons of self-sufficiency became competitive in time and was successful in the world market. In Breyer's opinion, there is nothing to prevent the same thing from happening with the development of the jet-nozzle process by Brazil. The KWU representative also identified economic interests outside the country that want to discourage it as well as its technological partner, Germany, from developing that process.

He admitted, however, that the jet-nozzle process will never achieve the low levels of energy consumption presented by the centrifugal process although it shows a potential in time to achieve the level of the gaseous diffusion process used by the United States.

Delay of Plants

With regard to the possibility of Brazil delaying the construction of the Iguape-1 and -2 plants until after the jet-nozzle process has proved its industrial efficiency, Wolfgang Breyer said that the commercial contracts between the KWU and the Brazilian Nuclear Corporation (NUCLEBRAS) for those two new plants have not yet been signed. But he pointed out that their delay would interrupt the continuity of the nuclear program and that NUCLEBRAS had already begun the contruction of the components of the Iguape-1 reactor in the NUCLEBRAS Heavy Equipment Corporation (NUCLEP) factory in Itaguai.

8711
CSO: 5100/2162

ANGRA-I TO REMAIN IN TEST PHASE THROUGH END OF YEAR

Rio de Janeiro JORNAL DO BRAZIL in Portuguese 17 Apr 82 p 19

[Text] Belo Horizonte--The president of the Furnas Electric Power Stations, Licinio Seabra, revealed in this capital yesterday that the Angra-I nuclear plant will not be released for operation until the end of this year or the beginning of 1983. Until then, according to him, it will remain in the testing phase until modifications are made in the steam generator.

He revealed that Westinghouse technicians will come to Brazil early next month to discuss with Furnas specialists what modifications will be made in the steam generator "to prevent the problems that have occurred in other countries." According to him, after the modifications, the plant will remain in the testing phase until the end of the year.

Jeopardy

The president of Furnas admitted that the Itaipu Binational is facing "cash-flow problems," having ended March with a debt of 8 billion cruzeiros to its contractors. He said that, for the time being, no hydroelectric project was affected; "there is only concern."

Mr Licinio Seabra also revealed that the lack of financial resources may "jeopardize" fulfillment of the timetables for completion of the transmission lines under the responsibility of Furnas, which continues its normal timetable of works for Itaipu. During a lecture in the international symposium "City and Energy," the president of Furnas pointed out that there must be a limit to the concentration of populations and decentralized industrialization.

He supported measures to prevent the growth of cities, speaking of studies that estimate that by the year 2000 there will be 25 million inhabitants concentrated in Sao Paulo and 20 million in Rio. He considered that the oil crisis marked the end of a phase of cheap energy and recognition of the limitation of nonrenewable energy resources.

8711
CSO: 5100/2162

AMMONIUM DIURANATE PRODUCTION TO BEGIN 5 MAY IN POCOS DE CALDAS

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 2 May 82 p 71

[Text] When President Joao Figueiredo inaugurates the industrial complex built by the Brazilian Nuclear Corporation (NUCLEBRAS) in Caldas, in southern Minas Gerais, on Thursday, Brazil will begin to produce the ammonium diuranate which, enriched in Europe, will serve as fuel for the nuclear reactor for the production of energy.

NUCLEBRAS developed the project 5 years ago, which represents the implementation of the first phase of the sophisticated, very costly and controversial nuclear fuel cycle. As in all inaugurations of public works, the atmosphere will be a festive one. That was implicit in the statements of NUCLEBRAS officials, who accompanied a group of 15 reporters to the site last Thursday.

Statements such as "that is a response to those who do not believe in the success of the program," or "there is the proof that we can become independent in nuclear technology" were repeated in informal talks with the reporters after a 4-hour tour of the highland. In that area, situated 30 kilometers from Pocos de Caldas, there were volcanic eruptions in another geologic age and today there is a deposit of 26,800 tons of uranium. Between the mining activities and those for the production of the "yellowcake," NUCLEBRAS and the contractors employ 860 persons, the majority recruited in the area itself, 90 of them top-level and 150 mid-level personnel. For the peaceful residents of the nearby cities, the operation of the complex does not represent anything more than the hope of employment, inasmuch as the other industries are not absorbing manpower as before and the rural exodus has intensified.

Uranium

The conventional festive atmosphere began in December of last year when the first 200 kilograms of yellowcake was produced, an insignificant amount compared to the operational capacity of the plant, which is 500 tons a year, operating 24 hours a day for 300 days.

The NUCLEBRAS facilities on the Pocos de Caldas highland--which include laboratories and support units such as the sulfuric acid plant--may be

used until the year 2000 if the plant is operated at full capacity. Uranium is associated there with other ores, such as zirconium and molybdenum. At the same time, that plant will produce an alloy of zirconium which has an application in the nuclear industry and in the manufacture of thermal insulators, as well as calcium molybdate, used in the cosmetics industry.

For some years, it will be sufficient to use only one deposit, that of Campo do Cercado, where uranium was found beginning in strata 40 meters deep. Removal of the raw stone will be done in the open-pit style. (The natural radioactivity is considered to be below the 2.5 mR allowable according to international convention.) In the future, there will be a single, gigantic pit with a rim area of 315,000 square meters and a depth of 300 meters, where the mineralized block ends.

Exploitation is possible now after the removal of a volume of 30 million cubic meters of burden in the premining phase, three times the amount used in the construction of the Furnas plant dam. Once the ore is reached, there are 55 million cubic meters to be removed with dynamite and transported in 35-ton trucks under radiometric control.

Once the primary stage of the mining is concluded the rock is crushed, being transformed into grains a maximum of 20 centimeters in size, and in the next phase, as small as 6 millimeters. The ground ore is added to water in a proportion of 45 percent liquid and 55 percent solids, resulting in a dark soupy mixture pumped to the plant through an ore pipeline 2 kilometers long.

The soft mass is ready to receive the chemical treatment that will result in the yellowcake. Initially the slurry enters a solution to filter the solid material composed of uranium, molybdenum, zirconium and impurities such as iron. Using organic resins, uranium and molybdenum are absorbed and later, by washing with other reagents, the uranium is separated. Ammonia is added by means of a precipitation process producing the ammonium diuranate in the form of a yellow paste which, after drying, results in the powder that is ready for marketing.

The yellowcake has to be enriched in order to be transformed into fissionable material suitable to be used in the nuclear reactor because in its natural form it contains only 0.7 percent fissionable uranium.

8711
CSO: 5100/2162

BAHIA MAY SUPPLY MATERIAL FOR SECOND 'YELLOW CAKE' PLANT

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 30 Apr 82 p 29

[Text] Pocos de Caldas--The superintendent general of mining engineering of the Brazilian Nuclear Corporation (NUCLEBRAS), engineer Jose Milton Sampaio, acknowledged yesterday that the uranium reserve at Lagoa Real in southern Bahia may serve as the raw material for the second Brazilian plant to produce yellow cake, beginning in 1987. According to him, the probable advantage of the Bahian reserve over that of Itatiaia in Ceara is due to the characteristics of the ore deposited there, which permit the preoperational tests to be made in the pilot plant of the Pocos de Caldas highland complex. This unit serves as the parameter for the first yellow cake plant in the country, which is to be opened next Thursday by President Joao Figueiredo in the Minas municipality of Caldas.

Yesterday, NUCLEBRAS permitted reporters to visit the area 32 kilometers in diameter in a volcanic region near the Pocos de Caldas resort and located for the most part in the neighboring Caldas to familiarize themselves with everything from extraction of the raw stone by dynamiting to the industrialization of ammonium diuranate (the yellow cake), stored in 200-kilogram drums and kept in a storage shed.

That is where the material will remain until it is sent to France and Britain for the enrichment phase because Brazil will not have mastered that stage until the completion of the Resende plant. With enrichment, the uranium becomes fissionable and can go into the nuclear reactor.

Advantage

According to NUCLEBRAS, the Itatiaia reserve is the largest in the country with 137,500 tons and the uranium is found easily on the surface unlike that of Pocos de Caldas, where excavations over 50 meters deep are required to reach it.

What the NUCLEBRAS experts are arguing is that its use in this decade would necessarily mean the construction shortly of a new pilot plant owing to the association of the uranium with phosphate. That would mean a delay of at least 1 year for the beginning of the commercial production of yellow cake in addition to larger investments.

Therein lies the advantage of Lagoa Real, in the opinion of Milton Sampaio. The Bahian reserve has only half the potential of the Ceara reserve, about 63,000 tons. The forecast is that, in his opinion, the Brazilian nuclear program will be requiring the second plant by 1987--that is when, according to the timetable, the Angra-II plant will be operating commercially, followed by Angra-III in 1988.

President Figueiredo will officially put into operation the different phases of the yellow cake production process in Caldas.

8711
CSO: 5100/2162

NUCLEAR TREATY SIGNING DEPENDS ON RELIABLE U.S. ATTITUDE

Johannesburg DIE VADERLAND in Afrikaans 19 Apr 82 p 12

[Editorial: "The Nuclear Nonproliferation Treaty"]

[Text] Conspicuous efforts are now being made by the Reagan administration to persuade South Africa, through pressure and sympathetic approaches, to sign the Nuclear Nonproliferation Treaty. It is more difficult to refuse such a request by a proven friendly disposed administration than if the request came from an inimical one.

However, we realize that even the U.S. policy toward South Africa is based on that country's own interest, and if it is in that country's interest to turn against South Africa not even the Reagan administration will hesitate to do so.

Thus in its decision about signing the Nonproliferation Treaty South Africa must also put its own interests above all.

Our declared policy is to use nuclear power for peaceful purposes and that is also being done. However, the possibility of being able to become a military nuclear power is a valuable deterrent especially in light of Russian expansionism and the arms buildup in Africa, even in some of our neighboring countries.

Finally we should also not forget the fact that, despite its friendly attitude, the U.S. still maintains an arms boycott against us and is still denying us enriched uranium for peaceful purposes.

7964
CSO: 5100/5651

NUCLEAR POWER IS ESSENTIAL FOR GROWTH, ASSERTS ELECTRICITY CHIEF

Johannesburg DIE TRANSVALER in Afrikaans 7 May 82 p 2

[Text] Jan Smit, chairman of the Electricity Supply Commission (ESCOM), declared yesterday that a minimum of 20 power plants, each with a generation capacity of 3,600MW, will have to be built to cope with the anticipated growth in energy consumption over the next 25 years.

Moreover, attention will have to be given to the role of nuclear power in the foreseeable future. It appears as if nuclear power will have to be an essential and inescapable part of the country's energy sources, according to Smit.

The long-term character of energy supplies makes it imperative to place orders now for power plants that will be put into operation in the second half of the next decade.

Smit's annual report revealed that in the year ending December 1981, ESCOM had sold nearly seven percent more electricity.

That is under the annual average of 8.2 percent over the preceding five years. The reasons given for the decrease are the reduction in economic activities experience by South Africa since the start of 1981.

According to Smit, "the decreased rate of growth in energy consumption is chiefly due to the worsening recession in industry and its impact on South Africa's export market."

It was also revealed that ESCOM's total revenue in 1981 totaled R2,142 billion, an amount less than what was budgeted for. This reduced revenue was blamed on the unanticipated decrease in energy sales, inflation and the increased cost of money for financing capital needs.

Fixed expenditures in 1981 totaled nearly R1,951 million, while total fixed assets at yearend amounted to R10,144 billion. R3,721 of this sum was for work still in progress.

Operating costs also were in the red because of unreliable supplies from Cabora Bassa and the resulting operation of ESCOM's older and less economical power plants. In order to meet the energy shortage head on, ESCOM has instituted extra overtime for maintenance and speeded up its construction program.

CSO: 4701/75

RADIOACTIVE WASTES FROM KOEBERG WILL BE NONPOLLUTING

Capetown DIE BURGER in Afrikaans 22 May 82 p 11

[Text] The radioactive wastes that will be released into the ocean and into the atmosphere by the Koeberg nuclear power plant will not lead to pollution of the environment. All the same, the environment will be constantly monitored for radioactivity. These statements were made yesterday by Minister for Mineral and Energy Affairs, F. W. de Klerk, in reply to a query in the House of Assembly.

In reply to still another part of the question by John Malcolmess (PFP, Port Elizabeth-Central), de Klerk stated that radioactive waste products will be buried on the grounds of the Koeberg plant under stringent radiation control guidelines, so that there will be danger posed on or from the Koeberg premises.

Only liquids containing extremely low radioactive residues, within the limits fixed and enforced by the Atomic Energy Board in compliance with internationally accepted standards, will be released into the Atlantic Ocean.

Marinelife and ocean sediments will be monitored regularly to ensure that there is not increase of radioactivity in the surrounding waters. According to de Klerk the liquids are not considered radioactive wastes in the true sense of the word.

Only "inert" radioactive gases that are non-contaminating will be released into the atmosphere. The gases will not concentrate in the environment. The releases will be staggered over time and at a rate that is within the limits fixed and enforced by the Atomic Energy Board in compliance with internationally accepted standards.

De Klerk declared "this release will not perceptibly increase the background radiation level on the fringe of the Koeberg site. Still, as a further preventive measure, flora and fauna will be monitored regularly for changes in radiation levels. The releases will constitute no threat to public health and safety."

Waste products of "low and intermediary activity" will be buried on Koeberg property. They will consist of spent resins from water treatment facilities

that are mixed with cement and then sealed in a thick-walled cement drum. Also included are crushed overalls, paper and other contaminated materials that will be sealed in steel drums.

"Stringent radiation control measures are applied in the burial of the waste and there is no chance of danger either on or from the site with that sort activity," asserted de Klerk.

CSO: 5100/5657

BRIEFS

N-PLANT SECURITY BROKEN--Cape Town--Three men using false identity documents breached the high-security system at the Koeberg nuclear plant near Melkbosstrand this week, overpowered a guard and tried to force open a safe. Details of the break-in, which occurred early on Monday, were released yesterday following an investigation. The Boland police liaison officer, Major George Kershoff, said three men entered the grounds of the nuclear plant--which comes on line next year--at about 4.15am on Monday. They broke into an office and attacked a guard, Mr Sampson Thobi (55). They hit him over the head with a hammer and then tried to force open a safe in the office. Mr Thobi managed to raise the alarm and help arrived. Koeberg security guards arrested a man. Two men escaped. An Escom spokesman, Mr G.J. Roussouw, said the break-in had occurred at the offices of an engineering subcontractor at the site. "It was a trivial matter and not Koeberg's indaba," he said.--SAPA. [Text] [Johannesburg THE CITIZEN in English 20 May 82 p 8]

NUCLEAR ACCIDENTS--House of Assembly--No insurance scheme providing cover for people against accidents at nuclear stations would be introduced by the Government, the Minister of Mineral and Energy Affairs, Mr F.W. de Klerk, said yesterday. Replying to a question by Mr John Malcomess (PFP Port Elizabeth Central) whether his department intended to introduce an insurance scheme providing cover for private individuals and property owners suffering harm or loss from accidents at nuclear stations, Mr De Klerk said that in terms of the Nuclear Installations Licensing and Security Act, liability for accidents rested with the licensee. Mr Malcomess asked him if he was aware that a number of insurance companies specifically excluded damage resulting from nuclear accidents from their policies. The Minister replied that the act contained a clause providing for comprehensive insurance. [Text] [Johannesburg THE CITIZEN in English 20 May 82 p 4]

MORE NUCLEAR POWER--Pretoria--Dr Ampie Roux, chairman of the Uranium Enrichment Corporation, has stated that in the future South Africa will increasingly use nuclear power to generate electricity leading to the construction of more nuclear power plants there. Dr Roux will be retiring at the end of June and in an interview he said that South Africa will have to construct larger uranium enrichment facilities to provide fuel for the nuclear power plants. [Text] [Capetown DIE BURGER in Afrikaans 22 May 82 p 11]

FUTILITY OF NUCLEAR IMPEDIMENTS--It has come to light that for some time U.S. brokers have been helping South Africa obtain enriched uranium for its nuclear power generators. This has been happening notwithstanding U.S. refusal to collaborate with the republic, because of the fact that we have not been willing to sign the nuclear nonproliferation treaty. Two things deserve special attention in this matter. The first is that the U.S. refusal to supply enriched fuel for the Koeberg development has not halted this enterpirse. South Africa has been able to obtain the necessary fuels from other sources even through the mediation of U.S. companies and this shows that boycotts seldom, if ever, succeed. Welcome is also the fact that the present administration has assumed a more balanced view with respect to the actions of the above-mentioned brokers. At any rate they are not violating the regulations of the nonproliferation treaty. Moreover, there are other entities in the rest of the world who would be willing to provide the same services. [Editorial: "Thoughts on Nuclear Matters"] [Text] [Johannesburg DIE TRANSVALER in Afrikaans 16 Apr 82 p 8] 7964

CSO: 5100/5651

HISTORY OF NUCLEAR COOPERATION WITH ARGENTINA

Hamburg DIE ZEIT in German 30 Apr 82 pp 9-11

[Article by Guenter Haaf and Josef Joffe: "The Karlsruhe Connection--Did the Germans Really Help the Argentines To Produce a Nuclear Bomb?"]

[Text] As England's naval fleet was still steaming toward the Falklands, Britain was already sustaining its next fateful adversity. Under the title of "Germany and the Argentine (Nuclear)-Bomb" the BBC last week "revealed" a horrible nuclear weapons conspiracy between Bonn and Buenos Aires. BBC reporter Robin Denselow took one hour to trace with his camera a trail which led from Wuerttemberg's Haigerloch to the Argentine pampas, from the nuclear labs of the Third Reich via Franz Josef Strauss to the presumed bomb factories of the Argentine junta. Germany, according to this colorful "political mystery story" (as government spokesman Ruehl called it), had been helping the Argentines to produce their own nuclear bomb for almost 40 years.

The British Foreign Office, which at this moment has a lot of other Argentine worries, still found the time to acknowledge that the Germans were acting "responsibly." But the English elite press took this chilling scoop, the "frightening revelation" (as the BBC touted it) at face value. "A hair-raising story," the London TIMES called it. And the Manchester GUARDIAN accepted, without further research, the thesis of an illegal Argentine "secret treaty with Germany."

The BBC people had conducted their research for 9 months; then, according to the FRANKFURTER ALLGEMEINE ZEITUNG, they let the "stink bomb" explode at the proper time. "I don't wish to say," said BBC producer David Taylor, "that we are holding the FRG directly responsible for this scandalous story. However..."

Millions of patriotically excited viewers learned last week that

- nuclear researchers of the Third Reich had fled with their research papers to Argentina in time and had continued to tinker with the bomb there--in the service of the coming "Fourth Reich;"

- a number of "veterans" had, after the reestablishment of FRG sovereignty (1955), regained employment and esteem at the Karlsruhe nuclear research

establishment, whence during the 1960's they conducted a secret transfer of bomb technology to Argentina;

- the Argentines would shortly be in a position to build their own bomb--thanks to the Germans' ruthless commercialism.

What are the facts, and how much of this is pure speculation?

The history of German-Argentine cooperation in nuclear technology partly reads like the scenario of a Marx Brothers movie: lots of action and not much content--the cast includes charlatans and conspirators, old Nazis and Jewish scientists, ambitious research administrators and South American dictators.

Clear connections are difficult to perceive, but ghostly tie-ins are much easier to make. At a closer look, the thick gas clouds begin to dissolve. What is left are vested interests, confused research policies and swaggering Argentine national pride. The residue is nuclear technological know-how in the hands of an ambitious, restless nation: Argentina.

The game of confusion between Rhine and Rio de la Plata is played in three phases:

Act one shows Nazis and refugees from the Nazis, adventurers and scientists looking for a new start. During the unstable postwar period, all of them are trying to settle down in Argentina.

In act two, the direction of travel is reversed. The newly independent FRG entices with its beautifully equipped, fast growing nuclear research centers. Old ties are of advantage to both sides.

The third act, still ongoing, is already proving that the danger is not over. On the contrary: after 3 decades of close collaboration with Germany Argentina does not have a bomb; but it does have the technological capabilities and facilities for producing the big one in case of need.

I

It is a fact that after 1945 Adolf Eichmann was not the only man to find refuge in Argentina. Among the fast travelers from the 12-year Reich were also Nazi hero Hans Rudel, aircraft builder Kurt Tank (who developed the first Argentine combat jet plane) and physicist Ronald Richter. They were followed in 1949 by nuclear chemist Walter Seelmann-Eggebert. His invitation to Tucuman University came about through the recommendation of an Austrian Jewish physicist named Guido Beck.

"As far as I know," says Seelmann-Eggebert, I was at that time the only German in Argentina who knew anything about nuclear matters." It took 2 years after his arrival in Tucuman before the Argentines realized that they had a pioneer of nuclear research in their country; they appointed the former colleague of uranium-splitter Otto Hahn to the Argentine National Nuclear Energy Commission in 1951. That commission's first task was to perform some

entirely non-scientific cleanup work: it had to disguise Argentina's first interest in the nuclear bomb. In the confusion of the postwar period the Czechoslovakian Ronald Richter, a student of today's GDR star researcher Manfred von Ardenne, landed in Buenos Aires also. This student, who had previously been stranded in Prague and Vienna, told Argentine dictator Juan Peron some tall tales about "controlled fission energy" with which he proposed to provide the South Americans with the hydrogen bomb, among other things.

Richter "completely snowed" Peron, reminisces Professor Pedro Waloschek, an Austro-Argentine, who at that time embarked on studying physics in Buenos Aires and who today is working at Hamburg's DESY high energy physics laboratory. The dictator generously built a huge laboratory in southern Argentina's Bariloche for the "charlatan" (as Seelmann-Eggebert refers to him). Richter ordered an impressive array of expensive equipment, some of it containing gold and platinum electrodes. With great fanfare, he arranged this instrumentation in sort of a Potemkin-type laboratory. When Argentine physicist Otto Gamba finally managed to inform Peron that Richter's enterprise was nothing but a fraud, none of the equipment in Bariloche had been connected. Small wonder: the expensive gold and platinum electrodes had disappeared.

Apart from the refugees from the Nazis and the emigrants who were simply looking for a new start in life, there were also hordes of old Nazis in Argentina--some of them linked as members of an SS overseas organization. The weapons specialists among the old comrades had resumed their war production activities far from the strange Argentine nuclear scene: in aircraft construction, in electronics and in conventional firearms. It was not surprising that they were totally ignorant of modern nuclear science: as far as the Nazis were concerned, the formula for converting mass into energy ($E=mc^2$), which is the basis of all atomic bomb construction, was nothing but "Jewish physics."

What were the Germans working on in those days? In an interview with ZEIT, Antonio Carrea, a member since 1954 of the Argentine National Atomic Energy Commission (CNEA), had this to say: "They were mostly engaged in isotope research and trained the first generation of our nuclear scientists. Toward the middle of the 1950's they returned to Germany."

But the Germans were not the only ones who introduced the Argentines to the nuclear age in those days. Young Argentine scientists swarmed all over the United States, England and Canada. The first research reactor was delivered by the United States in 1956. This one and its four successors (built in Argentina) were operated until early this year with enriched uranium made in the United States. When the United States stopped its export the Russians took over--in recognition of Argentine help in breaking the U.S. wheat embargo decreed by Jimmy Carter. The Germans were, and still are, in good company.

II

What remains of the Nazi tie-in? Mainly a gentleman by the name of Walther Schnurr, self-proclaimed "pope of explosives" in a top level position with IG Farben, who was used in the BBC broadcast as a string puller and star witness. Walther Schnurr, now 77, considers Argentina his "second fatherland," a country "where in those days (during the Peron era) one had no political difficulties."

The BBC people considered the former German decathlon champion and extremely talented chemist (who has more than 50 patents to his credit) to be the main link between German and Argentine nuclear ambitions, for practical purposes ever since the collapse of the Third Reich. It is a fact that the late joiner of the Nazi party (1937) commuted steadily between his first and second fatherlands for a quarter of a century. His Argentine career was a modest one--he was a part owner of a small explosives factory; only on his return to Germany did he move up rapidly, when then Minister for Nuclear Energy Franz Josef Strauss appointed him a division chief in his department. Five years later he was promoted to associate director of the Karlsruhe nuclear research center, where he stayed until his retirement in 1970.

The establishment of the nuclear research center in 1956 was preceded by severe labor pains. Heisenberg, who had assembled the best and most experienced physicists, wanted to attach the reactor to his Max-Planck Institute in Munich. But the circumspect Nobel Prize winner got in the way of the ambitious FRG nuclear planners--among them Nuclear Energy Minister Franz Josef Strauss. "It bothers me," Heisenberg wrote later, "that for the people who are here making the most important decisions, the lines of demarcation between peaceful nuclear technology and nuclear weapons technology were just as indistinct as those between nuclear technology and nuclear basic research."

Why was it that Strauss specifically brought Schnurr from far-off Argentina? "I believe because I had wide experience in accomplishing big things," Schnurr replied to the BBC reporter. "He was a combination of expert and manager," Strauss explained in Bavarian-accented English.

Rather than picking members of the first team, the new nuclear people working for Strauss and Karl Winnacker, then chairman of the Hoechst Farbwerke, picked their own people for the Karlsruhe nuclear research center: for scientific director, Heidelberg physics professor and close friend of Strauss Otto Haxel; for technical director, industrialist Gerhard Ritter and as administrative director, lawyer Rudolf Greifeld. Like Schnurr, none of the three Strauss and Winnacker buddies had much experience in reactor construction upon assuming office. On the other hand, Greifeld's past as a member of the German high command in occupied Paris caused frequent disturbances in the center, and especially among his colleagues in France (excerpt from a Greifeld letter of 3 January 1941: "Lately the Jews are making themselves very comfortable again in Paris").

In his ten years as associate director, Schnurr, the friend of Argentina, weathered a number of scandals. Thus for instance in 1969, then Research Minister Gerhard Stoltenberg was forced to admit in the Bundestag that Schnurr was paid for what was supposed to be his honorific consultantcy to the "German Atom Forum." Schnurr was also involved in the affair concerning the purchase of two expensive cooling devices, even though Karlsruhe had a requirement for only one. Said a former Karlsruhe institute director: "Schnurr had a more South American than a Teutonic attitude--he was generous and unworried. And he saw in Argentina a great opportunity for the German nuclear industry."

Another colleague from the Karlsruhe days reminisced that "Schnurr retained a very definite interest in his host country. During his tenure as associate director he made periodic trips to Argentina--even for his vacations. He was in close touch with Castro Madero (the present chief of the Atomic Energy Commission) and his two predecessors. Because of his extensive contacts, Schnurr played an important part in Atucha-I."

Atucha-I, not far from Buenos Aires, is the first South American nuclear reactor (320 megawatt). It was sold by the FRG, built by Siemens. The year was 1968, and it was the Germans' first nuclear export breakthrough. They were selected even though the Americans had made a lower bid and the German model had not proven itself. The decisive factor was a technological difference of overriding political significance: the U.S. light water reactor required enriched uranium; the Germany heavy water type, natural uranium. The Argentines have masses of the latter in their own country (20,000-40,000 tons); the enriched fuel is available only in the monopolistic United States. In the words of CNEA official J.A. Sabato at the time: "The major disadvantage of the light water model is the fact that at this moment only the United States offers commercial uranium enrichment."

III

One thing has been certain since the 1950's: to the Argentines, whether under a dictatorship or a democracy, national independence in nuclear energy matters was always of greater importance than price or profits (a natural uranium reactor costs about 50 percent more than a light water power plant). With the decision in favor of heavy water (a second reactor was purchased from Canada in 1973) they had mastered the first step of the fuel cycle. Two more steps were necessary which could theoretically lead to bomb production also: a heavy water production plant, a fuel element plant and a reprocessing facility in which pure plutonium, suitable for bomb manufacture, would be separated from the uranium waste products. Whoever is in possession of this chain can produce the substance necessary for the production of bombs. However, having the facilities is no proof of military intentions. Plutonium is a valuable splitting material which can again be reintroduced into the fuel cycle process.

For Buenos Aires such a big spending program is of course less urgent than is the case in other states: Argentina has enormous uranium reserves; its power plants, two of which are still in process of completion, require only

natural uranium. As to waste disposal, there is no need for the equivalent of Gorleben. The thinly populated country (eleven times the size of the FRG with one-half the number of inhabitants) can afford to bury the hot waste in the pampas.

Nevertheless the Argentines have for many decades practiced a policy of economic self-sufficiency which is as stubborn as it is deft: it had to be the entire cycle. Fuel production they learned from the Germans early on. The technology of zirconium production (indispensable for fuel rod casings) they bought from the Russians in 1980--exactly when Jimmy Carter used the wheat weapon because of Afghanistan.

The only things missing were the heavy water and reprocessing.

The BBC detectives now come up with something stupefying: a "secret treaty" between Bonn and Buenos Aires, which, among other things, provided for the sale of reprocessing equipment (so-called "hot cells"). Their star witness: Walther Schnurr.

"At the time, I offered the (Argentine Atomic Energy) commission an agreement for cooperation. It is still in force today." The most important point of collaboration concerned nuclear energy, but "other subjects also."

To this day persistent rumors are circulating in Karlsruhe, according to which then Associate Director Schnurr (1960-1970) had been extremely generous. A physicist who has for many years been working at the nuclear research center says: "During the 1960's, Schnurr made the Argentines a present of a reprocessing facility. Nobody outside the Schnurr circle knew anything about this. The story came out when our former colleague Leon Gruenbaum (who had been workin in the 'fast breeder reactor' group) gave an interview to the Belgian newspaper LA WALLONIE some years later. I asked an old associate of Schnurr's whether this was true, and he said yes."

Government spokesman Lothar Ruehl makes a categoric denial: "There is no secret treaty between the FRG and Argentina. Nor has there ever been one." There is however an official "cooperation agreement" dated 28 November 1969 for all to see--published in the FRG legal gazette of 17 January 1970. The text of the agreement is concise: the exchange of scientists and information; joint research projects; the construction and use of scientific and experimental facilities.

Just as concise is the statement of Karlsruhe board member Dr Hans Hennies, erroneously designated "the present director" by BBC reporter Denselow: the Argentines, he said, "had to learn how to handle radioactive fuel, and this was achieved by our providing them knowledge about the production of hot cells, experimental equipment for reprocessing research..." A facility, in fact? "Not a de facto facility; only experimental equipment..."

The experts agree at least that toward the end of the 1960's Argentina built a testing laboratory which continued to function until the early 1970's. At

the moment they are constructing a major pilot plant which until now has not been subject to any international controls. Government spokesman Ruehl is correct in emphasizing that today "no German partner is involved in the construction and operation of reprocessing facilities." The need for such a partnership is long past, because in the meantime the Argentines have learned enough to be do-it-yourselfers.

There remains the final step: the production of heavy water, the key element in operating a natural uranium reactor. Ever since Jimmy Carter assembled the worlds' nuclear powers in London at the end of the 1970's in a "suppliers' club" (with the objective of exercising control of weapon-suitable equipment), heavy water and reprocessing facilities have been at the top of the list of "sensitive" export goods.

At that exact moment the Argentines invited bids for a lucrative large contract: for construction of a heavy water factory and a natural uranium power plant with twice the capacity of Atucha-I. The FRG and Canada rushed to Buenos Aires as offerors--to begin with, in great harmony. Both had apparently agreed to demand "full scope safeguards" from the Argentines--shop talk for comprehensive surveillance by the Vienna-based IAEO atomic authority.

"Full scope safeguards" are equivalent to a net which covers the receiving country in its entirety: not only the newly imported materiel, but all nuclear facilities must be made accessible to the inspectors from Vienna. But the Argentines declined to accept this rigorous control as stubbornly as they had refused to sign the nuclear test ban treaty.

In contrast to the Canadians, the Germans finally made concessions. And, writes U.S. South America expert John Redick, "there are some indications that the German representatives misled the Canadians in order to grab the contract--by letting the Canadians think that they too would insist on universal surveillance." In the meantime, a discreet parallel deal with Switzerland got started, which the Argentines regarded as a signal for splitting: they ordered the reactor from the German Kraftwerkunion, the heavy water plant from the Swiss firm Sulzer. This was an elegant way of circumventing the full scope safeguards: the Swiss, not being as meticulous as the Canadians, insisted on international control, but only for their part. Being the providers of the less "sensitive" reactor, the Germans could in good conscience also renounce total control.

In the year 1979 the Argentines had finally reached their objective: they had assembled all the components inside their country which would some day provide them with mastery of the complete nuclear fuel cycle. But it was not only the Germans who had helped them; the list included the Americans, the Russians, Canadians, Englishmen, Frenchmen, Italians and Swiss.

Could they build a bomb? In principle, yes. Are they permitted to build a bomb? In principle, no. IAEO lawyer Reinhard Rainer says that "the 11 safeguard agreements with our authority actually cover every component of the Argentine program." And what about the uncontrolled reprocessing

facility? "The surveillance covers this. Should for instance the waste material from Atucha-I get into that facility, the Argentines would have to permit access to our inspectors."

Do the Argentines want to build a bomb?

Walter Seelmann-Eggebert feels that while the Argentines with their "strongly exaggerated nationalism" have very ambitious plans with their nuclear technology, they are still a long ways away from the bomb. In the opinion of that Argentina expert, at least another 10 years would have to pass before Buenos Aires could produce what the charlatan Richter promised to dictator Peron 31 years ago: a primitive atomic bomb.

9273
CSO: 5100/2167

DEPENDENCE ON USSR FOR URANIUM ENRICHMENT NOTED

Bonn VORWAERTS in German 22 Apr 82 p 22

[Article by Nikolaus Piper: "The Utterly Inconspicuous Dependence: About the Slight Difference Between Uranium Deals With the East and Gas Deals"]

> [Text] Going almost unnoticed by the public is the fact that the supply of FRG nuclear power plants with enriched uranium has become dependent on the Soviet Union to a high degree.

The affair is almost a grotesquerie. Franz Josef Strauss, prime minister of the Bavarian Free State, was in the United States on a state visit early in March. During this visit the conversation touched on the natural gas pipeline deal between the Soviet Union and several West European countries, a deal about which the Reagan administration had registered the strongest misgivings.

The BAYERNKURIER was able to report at that time: "Strauss' viewpoint is clear. He would not have signed the agreement because he rejects all economic relations with the Eastern Bloc which make the West dependent for its energy supply."

Shortly before Strauss left for Washington, a member of his cabinet, State Minister Alfred Dick, had to deal with an energy policy "dependence on the Eastern Bloc" of an entirely different nature. On 10 March he replied to a written question by Upper Palatinate FDP Landtag Representative Kurt Sieber:

"Bavarian energy supply enterprises have not bought any uranium in the Soviet Union; /they merely had the uranium enriched in the Soviet Union/." [In italics]

Had Minister Dick been a little more precise, he could have told the representative considerably more: In 1980 the Soviet Union supplied about 40 percent of the weakly enriched uranium in the Federal Republic. This is a degree of dependence which is considerably higher than the degree to which the FRG will be dependent on Soviet natural gas once the natural gas pipeline is built.

Fuel elements processed in the Soviet Union were burned in the Biblis and Neckarwestheim nuclear power plants, at the Grafenrheinfeld in Bavaria and in the Niederaichbach nuclear power plant, which has been shut down in the meantime.

It would also have been interesting, particularly for the Bavarian FDP representative, to know the way in which the fuel elements traveled between the Soviet Union and FRG energy supply enterprises.

Nuclear power plant operators delivered the unprocessed fuel to "Uranservice" [Uranium Service], a Soviet foreign trade firm, and received their enriched material back from it. The Duesseldorf firm which carries out the transfers and is the only party to the contract with "Uranservice" is "Rohstoff-Einfuhr- und Handelsgesellschaft mbH" [Raw Materials Imports and Trade Company, Ltd], owned by the couple Alfred and Renate Hempel.

On the firm's advisory council, besides Carl Zimmerer, managing director of "Interfinanz" and regular guest in conservative discussion circles, there is also Wilhelm Fritz, chairman of the board of Agrippina Insurance. In his second job Fritz is also president of the Bavarian Regional Sports Association and a regular hunting companion of Franz Josef Strauss in the Bavarian mountains.

Jimmy Carter's Misgivings

And, after all, the unusually high level of enriched uranium imports from the USSR is not due to the illusions of detente-hungry social liberals, but instead chiefly to earlier political decisions of the FRG's great ally, the United States.

Until the beginning of the 1970's, the United States was the only supplier of enriched uranium to the FRG and to most of the countries of Western Europe. The technology of uranium enrichment is costly and energy-intensive. And it is militarily sensitive, because in principle it is not very different from the process for producing atom bomb material.

What is involved is the enriching of uranium isotope U 235, which is valuable because it is fissile but which is present in natural uranium at only 0.7 percent, to 3 percent in order to make it possible to burn it in a light water reactor. For an atomic bomb U 235 must be enriched to more than 90 percent.

In 1973, Euratom, the European atomic energy authority, noticed for the first time that the nuclear fuel supply for European nuclear power plants could be jeopardized. The U.S. Atomic Energy Commission, USAEC, let it be known that its capacity was fully taken up and that it could no longer accept new enrichment orders from Europe.

At that time, as remembered today by a negotiator of that time, "the United States made a crucial mistake": it departed from the principle of nondiscrimination. It supplied domestic energy suppliers in preference to foreigners. It proved thereby that, especially for smaller countries, nuclear supply security was not as good as had appeared to that point.

Under these circumstances the Europeans first put their plans for the construction of a uranium enrichment plant into concrete form: the two projects Eurodif and Urenco were started. Simultaneously, and still more importantly, Euratom in its need found a new party to the contract: the Soviet Union. The Soviet Union proved to be an obliging and courteous contract party. It recognized Euratom--for the first time--as an independent organization, and it made delivery under the same conditions as the United States--but at a price averaging 5 percent less.

Thus, as early as 1974, more than 30 percent of the weakly enriched uranium in the FRG came from the USSR. In 1977 the development intensified when the U.S. President at that time, Jimmie Carter, exerted pressure on the enrichment contracts, mainly for fear of proliferation of nuclear weapons, and the Europeans feared they would not receive anything more from the United States. In 1978 and 1979, the Soviets supplied approximately half of the FRG's weakly enriched uranium and ousted the United States from first place among suppliers.

Serious, Obliging Business Partners

The "Economic Association for the Recycling of Nuclear Fuel" at Bonn judges the business practices of the Soviet partner to be "serious, obliging and above all beyond a shadow of a doubt." Supply contracts are secured up to the year 2005.

To be sure, if the criteria of opponents of the natural gas pipeline deal--for instance, Strauss or the U.S. Government--are used, then despite Soviet contractual adherence, this dependence is a threat. If not, however, then a substantial dependence on Soviet natural gas is also no danger.

On the other hand: How secure a supply is there in fact for nuclear energy?

Although the Reagan administration is trying to repress Carter's nuclear misgivings, and to protect its reputation as a reliable partner in the enrichment business, the Carter era showed how rapidly the supply of nuclear fuel can become unpredictable, even when the supplier is in the West.

5586
CSO: 5100/2163

ESMERALDA PROJECT RESEARCH ON SODIUM FIRES REVEALED

Paris LE MONDE in French 14 Apr 82 pp 13,14

[Article by Jean-Francois Augereau: "Esmeralda Program for Breeder Reactor Safety. How to Control Sodium Fires Involving Tens of Tons of Sodium."]

[Text] Contrary to the vast majority of nuclear power plants, which use water to evacuate the heat produced in the reactor core, breeder reactors, such as the Super-Phenix reactor which the FRG, Italy and France are now building on the Rhone at Creys-Malville (department of Isere), use liquid sodium as a coolant. Whereas this metal, which is a solid at room temperature, has thermal and neutronic characteristics which enable it to satisfy the requirements of breeder reactor constructors, it also has the disadvantage of producing a violent reaction when in presence of water or oxygen.

This peculiarity has been a cause of concern for nuclear energy experts who have been studying these phenomena and the means to control them for already 10 years. Experiments of this kind are routinely carried out at the Nuclear Research Center of Cadarache (department of Bouches-du-Rhone) on amounts of sodium of up to 1 ton. This is still a far cry from the amounts contained in industrial breeder reactors. This is why the Atomic Energy Commission (CEA) is now completing at Cadarache the construction of a number of buildings which will soon be used to study--under the Esmeralda program--the larger fires (70 tons of sodium) which, according to the experts, could result from accidents in breeder reactor plants.

As some 20 antinuclear committees and associations, which left Creys-Malville on 28 March, are marching on Paris where they are expected to arrive on Saturday 17 April to denounce the dangers of breeder reactors, the CEA is opening the doors of its Cadarache Nuclear Research Center to present the state of the art on sodium fire research. Although the CEA denies any intentional planning, the subject chosen is remarkably relevant to offset the statements of nuclear power opponents who wish to draw public attention on the problems connected with the storage, handling and use of large amounts of sodium.

Found all over the earth under different chemical forms, and especially as chloride (sea salt), sodium is the object of a relatively large industry: in France, the Ploubieres-Saint-Marcel (department of Savoie) plant of the Pechiney-Ugine-Kuhlmann group produces 13,000 tons of sodium annually. As for the United States, their production amounts to 220,000 tons. In other words, sodium is commonly used. For instance, it is used in the production of titanium and tetraethyl lead--used as an anti-knocking agent in the premium gasoline for internal combustion engines--as well as in numerous synthetic pharmaceutical products.

The nuclear uses of sodium, however, are of more recent origin and almost exclusively the result of breeder reactor development. In order to discharge the power produced in their cores, reactors of this type require a coolant with a relatively high atomic mass so as not to slow down excessively the neutrons, with good neutronic properties so as not to absorb too many neutrons, and with excellent thermal properties in order to evacuate the heat produced by the fuel.

Sodium has all of these properties: it has a satisfactory calorific capacity, an excellent heat conductivity; at 550°C its viscosity is close to that of water at 20°C; and it can be used over a wide range of temperatures since it boils only at 651°C. All these characteristics make it possible for the breeder reactors to operate under low pressure, cortrary to the traditional nuclear power plants.

The Chevtchenko Accident

These advantages are offset by an unfortunate characteristic which is the result of sodium chemistry itself. According to the director of the Nuclear Safety and Protection Institute, Mr Pierre Tanguy, "whereas, under normal conditions, sodium is perfectly compatible with the materials with which it normally comes into contact, the risks of accidental contact of sodium with water and air must be taken into consideration in the safety studies" (of reactors).

In fact, at room temperature sodium combines spontaneously with water. It then releases hydrogen which reacts with atmospheric oxygen and can either burn or explode.* Now, water is present everywhere in steam generators where heat exchanges take place between the sodium of the plant secondary circuit and the water which, as steam, will power the turbo-alternators (see insert). Therefore, a defective weld, a pipe failure are enough to trigger the reaction. This phenomenon is in no way unlikely. It has already occurred, as witnessed by the accident which, in 1974, caused severe damages to one of the buildings of the Chevtchenko breeder reactor power plant built by the Soviets on the shore of the Caspian Sea.

Therefore, to remedy such accidents, and prevent them from turning into disasters the steam generators of breeder reactors such as the Phenix and

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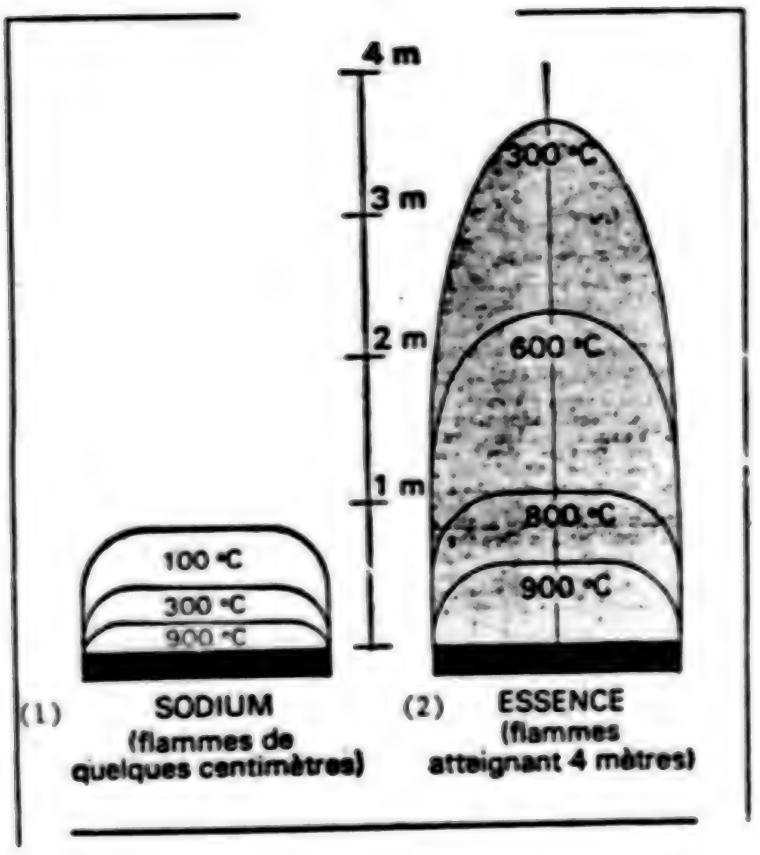
* A reaction of this type also occurs when sodium and concrete come into contact. This can be prevented by covering the ground with metal.



Key:

1. Sodium (height of flames: a few centimeters)
2. Gasoline (height of flames: up to 4 meters)

Characteristics of Fire	Sodium	Gasoline
Rate of combustion	35 kg/m^2/h	120 kg/m^2/h
Heat of combustion (calorific power).	10,000 kJ/kg	44,000 kJ/kg
Flames	little flame	several meters high
Temperature 80 cm from surface . .	less than 100°C	800°C
Quantity of air consumed	1 m^3/kg	10 m^3/kg

The above chart and table show the essential differences between a sodium fire and an oil-product fire. The main differences are in the height of the flames --a few centimeters for sodium fires compar h a few meters for oil-product fires--and in the temperature diagram, the atures near a sodium fire being relatively low.

Super-Phenix, are provided with several safety systems: ultra-sensitive hydrogen detectors, drainage systems, quick-lock shut-off valves, flexible membrane devicer to evacuate the hydrogen produced, etc.

Sodium will also readily react with hydrogen. At room temperature, its oxidation occurs slowly; however, as soon as the temperature rises, it can turn into combustion and eventually result in a sodium fire, either as a sheet of fire when sodium is merely flowing, or as a sprayed sodium fire when sodium is projected under pressure into the atmosphere, or again as mixed fires combining these two phenomena, the latter being a frequent risk in the case of sodium contained in the reactor secondary circuit.

According to Mr Jean-Claude Malet, head of the Sodium Fire Section at the CEA, "it would take a core fusion accident to release enough energy to cause a leak in the barrier formed by the reactor main vessel" which contains most of the 3,100 tons of sodium of the primary circuit. "The amount of primary sodium which might leak out of the reactor vessel would do so under high pressure, through small-section cracks, and the result would be a spray fire which would propagate itself inside the dome. (...) To remedy accidents of this type, we would allow the fire to spread in this enclosure which would form a third barrier for the contaminated products escaping from the core, a fourth barrier being provided by the reactor building."•

Tens of Tons

According to him, these successive enclosures confine the main risk to the secondary sodium circuit. If a small leak occurs, or if a large-section pipe is crushed ("guillotine" effect), amounts of sodium ranging from tens of kilograms to tens of tons are immediately released. However, since the pressure in the pipes is low, it can be assumed that the resulting fires would, in that case, be sodium sheet fires.

As early as 1972, the CEA started a program of theoretical and applied studies on sodium-water reactions and sodium fires. These studies took place at the Cadarache Nuclear Research Center; they have made it possible to develop a series of measures to control sodium-water reactions, to acquire a better knowledge of the combustion mechanisms of sheet fires, and to perfect fire-fighting devices such as extinguisher tanks and extinguishing powders.

The task, however, has not been easy. Considered from a certain angle, sodium fires have encouraging characteristics--the reaction releases relatively little heat, the fire does not propagate at high speed as when oil products are burning, the flame is short (a few centimeters) and, in spite of the flames, the sodium temperature remains moderate and well below its boiling point; nevertheless, serious difficulties are encountered when trying to extinguish them. The reason is that, at the temperatures involved, "few substances are inert toward sodium."

• LA RECHERCHE, October 1978

In addition, it is not enough to extinguish a sodium fire; the extinction must be durable, i.e. the product used--a powder--must remain active until the sodium temperature is well below its minimum fire point (approximately 140°C). In spite of that, at the CEA and at the Orleans research center of CNRS [National Center for Scientific Research], teams of researchers on combustion and high-temperature chemistry have developed a powder which has given excellent results both with sodium fires and with heavy oil and electric cable fires.

This substance consists of a sodium carbonate hydrate, lithium carbonate and graphite; it somehow smothers the fire by separating the sodium from the oxygen with which it would react. It has the additional advantage of clinging to walls onto which it can be sprayed, and above all of ending immediately the production of very dense and opaque white smoke released by sodium fires and against which fire-fighters must protect themselves.

At Cadarache, CEA research teams routinely extinguish one-ton sodium fires. Two hundred kilograms of Marcalina powder are enough to control such an accident at first.

However, the results of these successful experiments cannot be directly extrapolated to larger fires. Although the experts do not think it could occur, they will not rule out the possibility of a sudden rupture of a large-diameter pipe which, in a breeder reactor, could trigger a fire involving up to 70 tons of sodium. This is the reason for the Esmeralda project which is financed by France* (62 million francs) and Italy (31 7 million francs).

This reasearch program--the only of its kind in the world--involves setting tens of tons of sodium on fire and then controlling the fire in order to check the validity of the calculation codes developed with respect to the formation and dispersion of the aerosols resulting from fires, and the performance of the filters installed to intercept them, as well as to test the efficiency of the fire-fighting devices which could be used in fast-neutron reactors, of which Super-Phenix is the first industrial prototype.

Thanks to the Esmeralda facilities at Cadarache, the CEA research teams will be able to study in actual size, in a large 3,600 cubic meter vessel, the effects of sodium fires on the larger components of Super-Phenix (fuel element storage cylinder for instance), and to simulate, in a 20-meter high tower, (half-scale) accidents resulting from sodium-water reactions in steam generators. By September, everything should be ready for the first experiment, involving a one-ton fire. The amounts of sodium used will be increased progressively; the third experiment, in 1983, will involve some 20 tons of sodium distributed over a 30 square meter area. Approximately 10 experiments will take place each year; cost : 52 million francs over 4 years. Some fireworks!

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* At June 1979 prices. Ten percent of the French contribution will be financed by EDF [French Electric Company] and 5 percent by NERSA [expansion unknown] in which the interests of EDF and other European electric companies are represented; the remainder will be financed by the CEA.

Primary and Secondary Circuits

In a fast-neutron reactor, or breeder reactor, the reactor core is immersed in sodium which, through the primary circuit, evacuates the heat produced by the nuclear fuel. In an intermediate exchanger, the primary sodium--which becomes radioactive since it is in contact with the reactor core--transfers its calories to a secondary sodium circuit which is radiologically totally inactive. In turn, the secondary sodium heats water in a steam generator which, as its name indicates, produces the hot steam that will power the turbines and alternators supplying electricity to the network.

In the Super-Phenix reactor there are 3,300 tons of sodium in the primary circuit, 1,500 tons in the loops of the secondary circuit, and another 800 tons in the fuel-element storage cylinder and miscellaneous auxiliary circuits.

9294
CSO:5100/2159

LEGISLATION ON REORGANIZATION, NAME CHANGE OF CNEN

Rome STAFFETTA QUOTIDIANA PETROLIFERA in Italian 26 Mar 82 pp 4-6

[Offprint: "Law Instituting the ENEA (formerly CNEN)"; published in the GAZZETTA UFFICIALE No 79, 22 March 1982]

[Text] Law of 5 March 1982, No 84

Modification and integration of the law of 15 December 1971, No 1240, concerning the restructuring of the National Committee for Nuclear Energy.

The Chamber of Deputies and Senate of the Republic have approved and the president promulgates the following law:

Article 1

The National Committee for Nuclear Energy, instituted by the law of 11 August 1960, No 933, and modified by the law of 15 December 1971, No 1240, assumes the title of "National Committee for Research and Development of Nuclear Energy and Alternative Energy Sources (ENEA)" and is exempt from application of the law of 20 March 1975, No 70.

In all laws and regulations in force, the words "National Committee for Nuclear Energy (CNEN)" are replaced by the words "National Committee for Research and Development of Nuclear Energy and Alternative Energy Sources (ENEA)."

For the purposes of the present law, alternative energy is that recovered from sources other than hydrocarbons.

Article 2

Article 2 of the law of 15 December 1971, No 1240, is replaced by the following:

Article 2: Within the framework of the national policy on energy, the ENEA is charged with promoting the development and qualification of national industry regarding health and the environment.

For these purposes, the ENEA:

(1) in collaboration with the other entities affected, shall implement and promote the study, development and demonstrations pertinent to the energy technology under its jurisdiction and to energy conservation in the various phases of production, transportation and utilization, including the disposal of waste products from related processes;

(2) shall implement, promote and coordinate studies, research and experimentation on the ways in which the development and use of energy sources affect the environment and the health of workers and the population; and on the safety of energy-producing plants, including the safety of nuclear plants and protection from ionizing radiation;

(3) shall provide for transmitting acquired knowledge and the results of research and experience to industrial operators in collaborating with them on planning and building prototypes of components and plants;

(4) shall collaborate in scientific, technological and industrial areas with international and foreign entities operating in sectors under its jurisdiction both within the framework of international agreements and on the basis of directives from the ministry of Industry and Commerce and the ministry of Foreign Affairs with information to the ministry for coordinating initiatives in scientific and technological research;

(5) shall issue the regulations and exercise the supervision relevant to nuclear safety and to protecting the health of the workers and population against the danger of ionizing radiation; it shall account for special fissionable materials, raw materials and minerals; it shall verify the application of passive physical measures for the protection of nuclear plants and nuclear materials; and it shall implement international agreements on safeguarding special fissionable materials, raw materials and minerals;

(6) shall promote and support the training of personnel in the field of energy technology;

(7) shall publish and disseminate information on energy problems;

(8) shall give opinions, counsel and technical instruction to the administrative bodies of the nation, regions and local governments on problems connected with the production and utilization of energy. The ENEA is subject to article 107 of the decree of the president of the Republic of 24 July 1977, No 616.

To fulfill the charge under numbers (1), (2), (3) and (4) of the present article, the ENEA:

(a) may make contracts with the regions and local governments;

(b) on the basis of appropriate contracts may entrust to universities, institutes of research and experimentation, other entities and companies the performance of studies, research and experiments in order to carry out its scientific program;

(c) may make collaborative contracts with national industries and may make available to them its expertise, information, patents and other assets;

(d) may promote the formation of industrial consortiums made up of private, international or foreign corporations whose purpose is the industrial development of energy technology, and may participate in them in the framework of programs approved by the CIPE [Interministerial Committee for Economic Planning] and with the authorization of the minister of Industry and Commerce, who shall give prior notification to parliament.

Majority participation is permitted with companies whose purpose is research, development and demonstration in technological sectors under ENEA jurisdiction.

In the case of companies having production and commercial purposes related to the development of nuclear and alternative energy sources (excluding activities reserved to the ENEL by the law of 6 December 1962, No 1643 and subsequent modifications), the ENEA may have only a minority share of participation. In this case, participation quotas in national companies must be represented by patents awarded, information, equipment, plants or infrastructures as well as by expertise.

Article 3

Article 3 of the law of 15 December 1971, No 1240, is replaced by the following:

Article 3: At the ENEA's proposal, the minister of Industry and Commerce shall present the 5-year plan of operations to the CIPE in compliance with its regulations and for its approval, with provisions for financing for the entire period.

Three months before the end of the 5-year period, the minister of Industry and Commerce, on motion by the board of directors of the CIPE, shall present to parliament the plan for the subsequent 5-year period.

In the three months following the CIPE's approval of the 5-year plan, the minister of Industry and Commerce shall present to parliament a bill to allocate necessary financing to the ENEA within the limits of the resources of the state's annual and multi-year budgets; the minister shall also submit a detailed report to parliament on the program and the results achieved in the preceding 5-year period.

Every October, the minister of Industry and Commerce shall submit to parliament a progress report on the program.

The program is, of course, subject to revision, but these procedures shall apply nonetheless.

Article 4

Article 6 of the law of 15 December 1971, No 1240, letter (e) is replace by the following:

(e) shall submit to the minister of Industry and Commerce the prospective budget and statement of accounts payable and, by every 30 April, shall submit a report on the Committee's activity of the preceding year; the report shall be approved by the board of directors.

Article 5

Article 7 of the law of 15 December 1971, No 1240, is modified as follows:

In the first paragraph, No (2), the word "nuclear" is replaced by "energy";

The 4th paragraph is replaced by the following:

The board of directors:

(a) shall formulate the Committee's regulations;

(b) shall supervise the implementation of directives from the CIPE and the minister of Industry and Commerce and, on the basis of these directives, shall formulate the Committe's multi-year program of activity and its possible annual revisions;

(c) shall formulate the budget 2 months prior to the beginning of each fiscal year and shall note possible variances and draw up the statement of expenditures within 4 months of the close of the fiscal year, supporting these statements with the report of results achieved and the progress of operations;

(d) shall consider the allocation of funds not directed to other agencies and offices;

(e) shall consider the business described in letters (a), (b) and (c) of article 2, 3rd paragraph;

(f) shall elect the members of the executive board;

(g) shall approve the regulations and contracts affecting employees' legal and salary status;

(h) shall consider the hiring and training of personnel and the appointment of directors, and the awarding of consulting contracts;

(i) shall consider nominees to the executive board or chairmanship, matters of employee contracts subject to decisions made by the board of directors on the various categories, and shall consider the entity's operating organization within the framework of the general directives issued by the board of directors;

(l) [no (j) or (k)] under the necessary limitations and to the exclusion of matters under (a), (b) and (c) of article 2, shall consider possible delegations of authority to the executive board, chairman, general director or directors of operating units as concerns the allocation of funds, the announcement and judging of competitive bidding, making contracts and placing supply orders;

(m) under the necessary limitations of expense shall consider any delegations of authority to the chairman concerning the assignment of particular study and research projects of a technical, scientific, economic or legal nature to outside contractors having special qualifications.

The 7th, 8th and 9th paragraphs are replaced by the following:

Within the limits of the present law, the board of directors has full management powers and responsibility for the ENEA commensurate with the purposes set forth in articles 1 and 2 of the present law.

The decisions of the ENEA are not subject to approval by the oversight authority.

Decisions under (b) in the preceding fourth paragraph relating to multi-year planning by the ENEA and to possible annual revisions shall be transmitted to the minister of Industry and Commerce, who shall submit them to the CIPE for decision under preceding article 3.

Decisions under (c) and (g) of the preceding fourth paragraph shall be submitted for approval to the minister of Industry and Commerce with notification to the minister of the Treasury within 60 days of receipt of decisions made under (c) and (g) of the preceding fourth paragraph; he shall approve them or return them with explanations for reconsideration by the board of directors. After 60 days, decisions not returned shall become effective.

The quorum of the board of directors is a majority of its membership. On a tie vote, the chairman shall have the casting vote. Votes shall be valid only with two-thirds of the membership present, including the chairman or his substitute.

Article 6

Article 10 of the law of 15 December 1971, No 1240, is replaced by the following:

Article 10: The president of the college of auditors and the auditors shall be appointed by decree of the minister of Industry and Commerce. The college shall have a term of office of five years and be composed of three acting and three alternate members, which shall include an acting auditor who shall function as chairman and an alternate designated by the Treasury minister.

The college shall provide for verifying acts of management, ensure that the bookkeeping is done properly and audit accounts.

It shall write a financial report, report periodically to the minister of Industry and Commerce, and may attend meetings of the board of directors. The chairman of the college of auditors or a member designated by him may attend meetings of the executive board.

The college of auditors shall also exercise its functions during the period of formation of the commission.

Article 7

The second paragraph of article 20 of the law of 15 December 1971, No 1240, is replaced by the following:

The ENEA's board of directors shall establish in advance criteria for determining compensation for performing tests, analyses, verifications and certifications requested by private parties or suggested by public entities and shall similarly

establish critera for making expenditures for the ENEA's own purposes, as provided by the law of 31 December 1962, No 1860, and by the decree of the president of the Republic of 13 February 1964, No 185.

Decisions made under the preceding paragraph are subject to approval as provided in the 8th paragraph of article 7.

Article 8

The legal and economic status of ENEA employees shall be established by a collective labor contract of three years duration that shall be concluded with the national union organizations having majority representation. Until the first collective contract goes into effect, employee labor relations shall be regulated on the basis of the law of 20 March 1975, No 70.

Participation in contract negotiations shall include ENEA and union delegations, and observers from the ministry of Industry and Commerce, the ministry of the Treasury, and the ministry for Scientific Research.

The work of ENEA employees is incompatible with any other private or public employment and the exercise of any other profession or trade.

Employees shall not hold positions as administrative advisors, liquidators, union officials or officials in a company or entity of any nature except as deemed necessary to the interests of the ENEA by the board of directors subject to the approval of the ministry of Industry and Commerce.

Article 9

ENEA personnel may, with their consent, be assigned to duty in public administrative bodies; Italian or foreign universities; international and community organizations; national, international or foreign centers, institutes or laboratories, research organizations or units of industrial corporations, upon reqest.

The present law with the seal of state affixed shall be inserted in the official register of the laws and decrees of the Italian Republic. It is the duty of all to observe it and have it observed as the law of the state.

Rome, 5 March 1982

[Signed] Pertini

[Signed] Spadolini, Marcora, La Malfa, Andreatta, Tesini

Seal: Darida

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CSO: 3104/166

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June 7, 1982